the morphology of the genus. In general the mycelium, aecidiospores, and uredospores offer no striking characters different from other rusts; a few points of interest, however, are noted. The mycelium is usually intercellular and nourished by haustoria; but in some species it penetrates the cells, and in *R. atrocrustacea* on Swartzia it penetrates the vessels, developing abundantly within them. In several species the mycelium is perennial. Aecidia occur in only a few species and present no unusual peculiarities. The uredospores correspond to those of other rusts; but in the species on Cassia the uredospores are formed between the epidermal wall and the cuticle.

The teleutospores, which constitute the most interesting spore-type, are treated with some detail. A great many modifications exist as to the number of cysts, spores, and hyphae making up the spore-heads; but the author has arranged these into types within which the mode of building up the spore-head is remarkably uniform. These types are briefly as follows: (1) all spore-heads have a definite number of stalk-hyphae, which is uniform for each species, and each hypha gives a definite number of outer and inner spores; (2) the number of hyphae bearing the spore-heads is variable, but each hypha bears a definite number of spores, which is uniform within each species; (3) there is no uniformity in the number of hyphae and spores; the simplest forms of this last type have a single stalk-hypha which bears several spore-cells.

Heretofore the genus Ravenelia has been regarded as related to Puccinia, but on account of the occurrence of longitudinal divisions in the heads, DIETEL thinks the genus bears a closer relationship to the genera Diorchidium, Anthomyces, and Sphaerophragmium.

In the purely taxonomic part of the work 81 species are described, all of which are placed in the genus Ravenelia. The genera Pleoravenelia and Neoravenelia, recently separated from Ravenelia by LONG, are not retained, being considered insufficiently distinct. The author divides the genus into two sections: Haploravenelia and Pleoravenelia, the former comprising Ravenelia of LONG. —H. HASSELBRING.

Bacteria and mineral salts.—BENECKE,[5] in an investigation of the pigment-producing powers of *B. pyocyaneus* and *B. fluorescens*, lays emphasis upon the need of careful purification of chemicals and selection of glass receptacles in bacteriological experiments with synthetic media. He used several kinds of glass control, including quartz, which is too expensive for general use, Jena glass which is K-free but contains Mg, resistance glass, Vienna glass which is probably Mg-free, Bohemian glass, and ordinary glass. With the various flasks he could obtain practically all the contradictory results of previous investigators, such as NOESSKE, THUM, JORDAN, GESSARD, SULLIVAN, and LOEW. By means of the controls he could trace most of the discrepancies in their results to impurities of chemicals or glassware. BENECKE's chemicals were washed and recrystallized

---

5 BENECKE, W., Untersuchungen über den Bedarf der Bakterien an Mineralstoffen. Botanische Zeitung **65**: 1–23. 1907.

from 3–6 times in Jena glass or in platinum dishes; the water was redistilled and kept in Jena or in Thüringen glass. The most important of BENECKE'S results, and those in which he is at variance with the investigators mentioned above, are as follows: (1) Dextrose or ammonium salts cannot be substituted for asparagin in the simple solution, asparagin 0.25 per cent., magnesium sulfate 0.05 per cent., potassium phosphate 0.02 per cent. (2) Potassium is necessary for development, although a very small amount of K-ions suffices for growth and pigment production. (3) Potassium cannot be replaced by lithium, sodium, or ammonium. It can be replaced by rubidium and caesium, though not to the same degree, the presence of 0.0000015 per cent. of KCl being sufficient for development, while RbCl must be 10 times, and CsCl 100 times, as strong. The latter are also more toxic than KCl in concentrated solutions. (4) The presence of magnesium in the solution is necessary for development. Growth occurred in Mg-free solutions in Jena glass, which has 5 per cent. Mg in it, while no growth was obtained in Vienna glass. This Mg relation has been a stumbling-block for many investigators. On the other hand, the conclusion of most of the other authors that phosphate is essential in the solution is confirmed by BENECKE, as is also the observation of JORDAN and of NOESSKE that the acid group SO_4 is necessary for pigment development in *B. fluorescens* and *B. pyocyaneus*. BENECKE, however, does not distinguish between the two pigments produced by the latter organism, which may not be alike dependent upon sulfate.—MARY HEFFERAN.

Infectious chlorosis.— Further studies of BAUR[6] on the infectious chlorosis of the Malvaceae have shown that green shoots which occasionally appear on variegated plants of *Abutilon Thompsoni*, Hort., are entirely immune to the disease and remain so. If a scion from one of these immune shoots is grafted upon a variegated plant, the scion produces only green leaves. If another scion of a green susceptible variety is grafted upon the first, the second scion will become variegated, showing that the virus is conducted unchanged through the immune piece. If, however, the experiment is conducted by using the immune species *Lavatera arborea* L. as the intermediate piece, no infection occurs in the second scion. In the first instance the intermediate plant is immune but does not affect the virus; in the second instance the virus is evidently destroyed. In his former paper BAUER showed that the virus causing chlorosis was developed only in the light. In the present paper the light relation is more fully investigated. It is found that somewhat shaded individuals, as when growing under shrubbery, lose their variegation, although growth is not greatly influenced. The optimum for virus formation, therefore, lies much above that for growth. Although shading the plants resulted in a diminution of the white areas, it was not possible by increased illumination to increase the areas above a certain maximum which

[6] BAUR, ERWIN, Weitere Mitteilungen über die infectiöse Chlorose der Malvaceen und über einige analoge Erscheinungen bei Ligustrum und Laburnum. Ber. Deutsch. Bot. Gesells. **24**:416–428.